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(71) Applicant (for all designated States except US): **SANDVIK AB** [SE/SE]; S-811 81 Sandviken (SE).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **SJÖÖ, Sture** [SE/SE]; Stigsrundan 75, S-806 42 Gävle (SE).

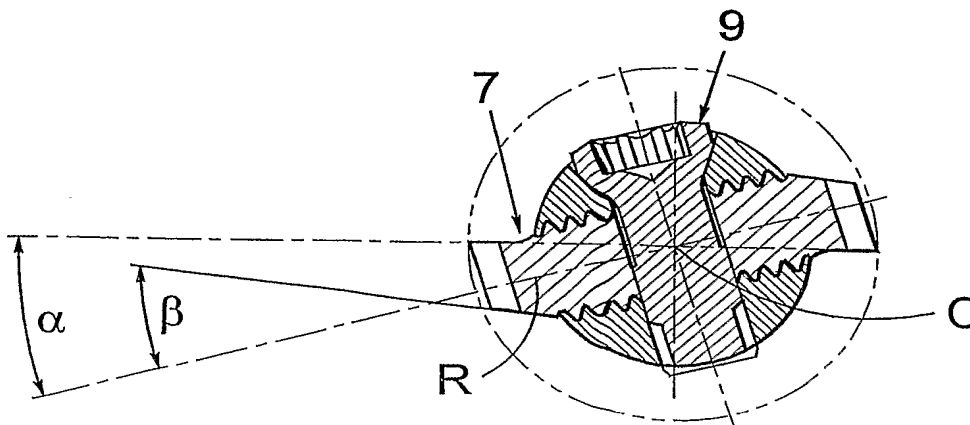
(74) Agent: **KLÖFVER, Jörgen**; Sandvik AB, Intellectual Property, S-811 81 Sandviken (SE).

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(54) Title: **SLOT MILLING CUTTER**



(57) **Abstract:** The present invention relates to a slot milling cutter, which comprises a cutting head (1) as well as a fastener (3) integrated with the cutting head, which fastener is intended to be received in a tool coupling, the cutting head (1) having an axially extending slot (5), in which a cutting insert, included in the slot milling cutter (7) and having teeth (19, 20) along two opposed edges, is received, as well as means (9) in order to fix the cutting insert (7) in the slot (5). The invention also relates to a cutting insert. Characteristic of the slot milling cutter according to the present invention is that the slot (5) is provided with opposed first serrations, that the cutting insert (7) is provided with second serrations (17, 18), which are arranged on the main surfaces (10, 11) of the cutting insert, that the first and second serrations (17, 18) extend in the axial direction of the slot milling cutter, and that a stabilization of the cutting insert (7) is effected in the radial direction of the slot milling cutter by co-operation between the first and second serrations.

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**SLOT MILLING CUTTER****5 Technical Field of the Invention**

The present invention relates to a slot milling cutter, which comprises a cutting head as well as a fastener integrated with the cutting head, which fastener is intended to be received in a tool coupling, the cutting head having an axially  
10 extending slot, in which a cutting insert, included in the slot milling cutter and having edges along two opposed sides, is received, as well as means to fix the cutting insert in the slot. The invention also separately relates to a cutting  
15 insert. The slot milling cutter according to the present invention is primarily intended to be used in thread cutting, however, the slot milling cutter may also be used in the manufacture of splines or cog wheels.

**Prior Art**

20 By DE-U1-G 92 11 669.8, a thread-milling cutter of the above-mentioned kind is previously known. The thread-cutting insert with which the thread-milling cutter is provided may be mounted in only one predetermined way in the slot of the cutting head as the thread-cutting insert has a recess, which  
25 co-operates with a bolt of the slot. According to the shown embodiment, the thread-cutting insert is fixed in the slot via two screws, which are on the same axial level of the thread-milling cutter.

By US-A-6,102,630, an end milling cutter is previously  
30 known, the cutting inserts with which the end milling cutter is provided as well as the insert pockets of the end milling cutter having co-operating serrations.

**Objects and Features of the Invention**

35 A primary object of the present invention is to provide a slot milling cutter having a cutting insert, which can be used both upon right hand and left hand rotation.

An additional object of the present invention is to provide an extraordinary good fixation of the cutting insert in the radial direction of the slot milling cutter.

Yet an object of the present invention is to, by means of the slot milling cutter, carry out a supplementing working step in connection with screw thread cutting being carried out.

At least the primary object of the present invention is realised by means of a slot milling cutter and a cutting insert having the features defined in the subsequent independent claims. Preferred embodiments of the invention are defined in the dependent claims.

### **Brief Description of the Drawings**

Below, an embodiment of the slot milling cutter according to the present invention will be described, reference being made to the accompanying drawings, where:

Fig. 1 shows a planar view of a slot milling cutter according to the present invention;

Fig. 2 shows a side view of the slot milling cutter according to Fig. 1;

Fig. 3 shows a section according to III-III in Fig. 1;

Fig. 4 shows an end view of the left end of the slot milling cutter in Fig. 1;

Fig. 5 shows a section according to V-V in Fig. 1;

Fig. 6 shows a perspective view of a cutting insert included in the slot milling cutter;

Fig. 7 shows a planar view of the cutting insert according to Fig. 6;

Fig. 8 shows a section according to VIII-VIII in Fig. 7; and

Fig. 9 shows schematically the cutting geometry of the cutting insert according to the present invention.

### **Detailed Description of a Preferred Embodiment of the Invention**

The slot milling cutter shown in Figs. 1-5 comprises a cutting head 1 as well as a fastener 3 integrated with the cutting head 1, which fastener is intended to be received in a chuck or the like of a machine tool. The cutting head 1 comprises a slot 5, which extends axially in the cutting head 1. The slot 5 is symmetrical in respect of a longitudinal

centre line C-C of the slot milling cutter, the longitudinal centre line C-C defining the axial direction of the slot milling cutter. The slot 5 is in principle defined by two opposed planar surfaces, which are located at a mutual distance that corresponds to the thickness of a cutting insert 7, which is included in the slot milling cutter according to the present invention. The opposed planar surfaces are provided with serrations, which extend in the axial direction of the slot milling cutter. The serrations extend along a major part of the axial extension of the slot 5.

Thus, the cutting insert 7 is received in the slot 5, and also the cutting insert 7 has serrations that co-operate with the serrations in the slot 5. Thereby, a stabilization of the positioning of the cutting insert 7 in the radial direction of the slot milling cutter is accomplished, i.e., perpendicularly to the axial direction C-C of the slot milling cutter. The serrations of the cutting insert 7 will be described more thoroughly below. The cutting insert 7 is fixed in the slot 5 by means of a screw 9, which is received in the cutting head 1 and extends through a centre hole of the cutting insert 9.

The cutting insert 7 shown in Figs. 6-8 is generally parallelepipedic and comprises two main surfaces 10 and 11, which are mutually parallel. The cutting insert 7 is further defined by two toothed edge sides 12 and 13, which also are mutually parallel. An additional delimitation of the cutting insert 7 is provided by two end sides 14 and 15, which in the embodiment illustrated are entirely smooth. The cutting insert 7 also has a centre hole 16, which intersects the two main surfaces 10 and 11.

Each one of the main surfaces 10 and 11 are provided with serrations 17 and 18, respectively, which generally extend parallel to the main directions of the edge sides 12 and 13. The serrations 17 and 18 are intended to co-operate with the serrations in the slot 5, and for that reason, the geometrical configuration has to be adapted between these serrations. As has been pointed out above, co-operation between the serrations aims to stabilize the cutting insert in the radial direction of the slot milling cutter.

The edge sides 12 and 13 are provided with teeth 19 and 20, respectively, the teeth in pairs being located exactly opposite each other. The teeth 19 and 20 generally have an extension perpendicular to the reference plane R of the cutting insert 7.

The cutting insert 7 generally has a negative basic shape, and furthermore the cutting insert 7 is symmetrical in relation to the centre axis C thereof, see Fig. 9. However, the cutting insert 7 has a positive cutting geometry, which is most clearly seen in Fig. 9. The chip angle  $\alpha$  has a value that is smaller than the clearance angle  $\beta$ . Thereby a clearance is created on the bottom side of the cutting insert. In addition to this clearance being advantageous in connection with slot milling being carried out with the cutting insert 7, it is, in the production of the cutting insert 7, also simple to grind the thread profile with a so-called crush roll perpendicularly to the cutting insert blank when the same has been fixed in the serration profile thereof.

The cutting insert 7 has also a chamfering 21 and 22 of 30° adjacent to the corners of the cutting insert 7, i.e., where the edge sides 12 and 13, respectively, meet the end sides 14 and 15, respectively. This chamfering 21, 22 has turned out exceptionally suitable in order to chamfer the drilled hole before the thread is formed.

#### **Feasible Modifications of the Invention**

In the above-described embodiment, the cutting insert 7 is provided with two diametrically arranged edge sides 12, 13. However, within the scope of the present invention, it is also feasible that the cutting insert has only one edge side.

**Claims**

1. Slot milling cutter, which comprises a cutting head (1) as well as a fastener (3) integrated with the cutting head, which fastener is intended to be received in a tool coupling, the cutting head (1) having an axially extending slot (5), in which a cutting insert, included in the slot milling cutter (7) and having edges (12, 13) along two opposed sides, is received, which sides extend in the axial direction of the slot milling cutter, as well as means (9) in order to fix the cutting insert (7) in the slot (5), characterized in that the slot (5) is provided with opposed first serrations, that the cutting insert (7) is provided with second serrations (17, 18), which are arranged on the main surfaces (10, 11) of the cutting insert (7), that the first and second serrations (17, 18) extend in the axial direction of the slot milling cutter, and that a stabilization of the cutting insert (7) is effected in the radial direction of the slot milling cutter by co-operation between the first and second serrations (17, 18).

2. Slot milling cutter according to claim 1, characterized in that the second serrations (17, 18) have an extension along the entire extension of the cutting insert (7) in the axial direction of the slot milling cutter.

3. Slot milling cutter according to claim 1 or 2, characterized in that the cutting insert (7) has a negative basic shape, and that the cutting insert (7) has a positive cutting geometry.

4. Slot milling cutter according to any one of the preceding claims, characterized in that the cutting insert (7) is chamfered in the area of the corners thereof.

5. Cutting insert (7) intended to be included as a replaceable cutting insert in a slot milling cutter, the cutting insert (7) being mounted in a slot (5) of the slot milling cutter, and that the cutting insert (7) has edges (12, 13) along two opposed sides, characterized in that the cutting

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insert (7) is provided with serrations (17, 18), which are arranged on the main surfaces (10, 11) of the cutting insert, and that the serrations (17, 18) extend parallel to the edge sides (12, 13) of the cutting insert (7).

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6. Cutting insert (7) according to claim 5, characterized in that it has a negative basic shape and a positive cutting geometry.

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7. Cutting insert (7) according to any one of claims 5 or 6, characterized in that it is chamfered in the area of the corners thereof.

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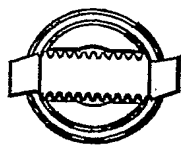


Fig. 4

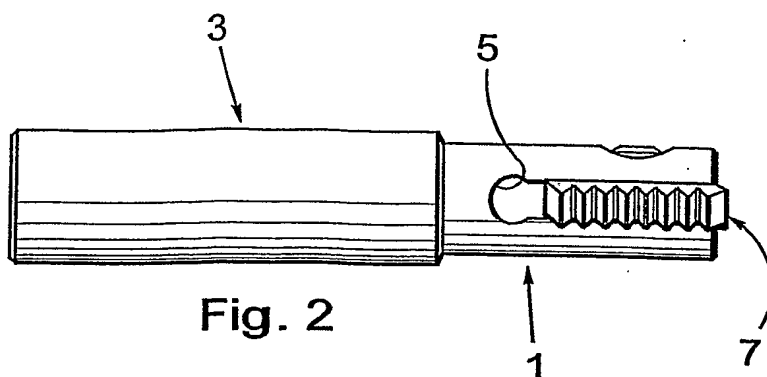


Fig. 2

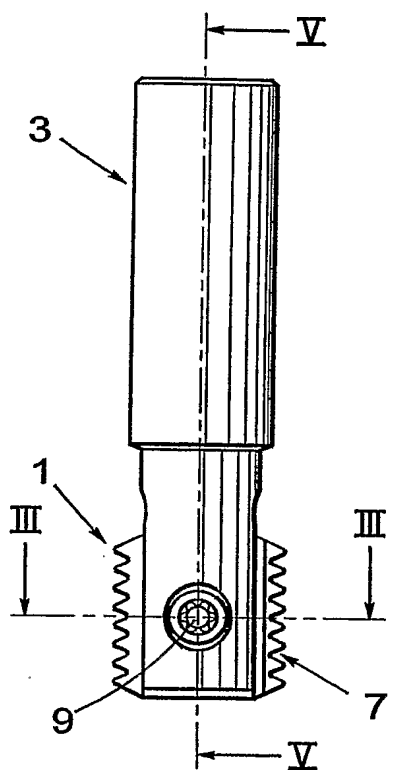


Fig. 1

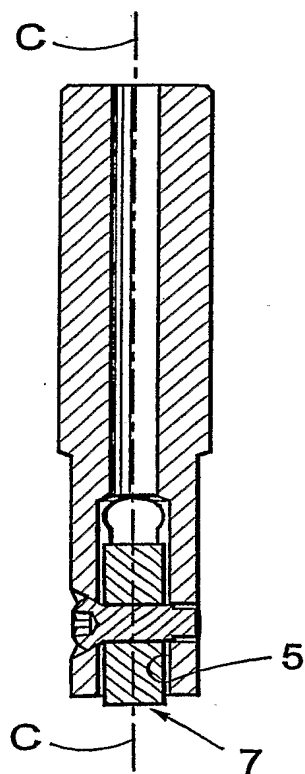


Fig. 5

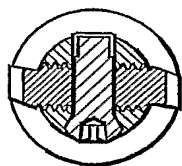
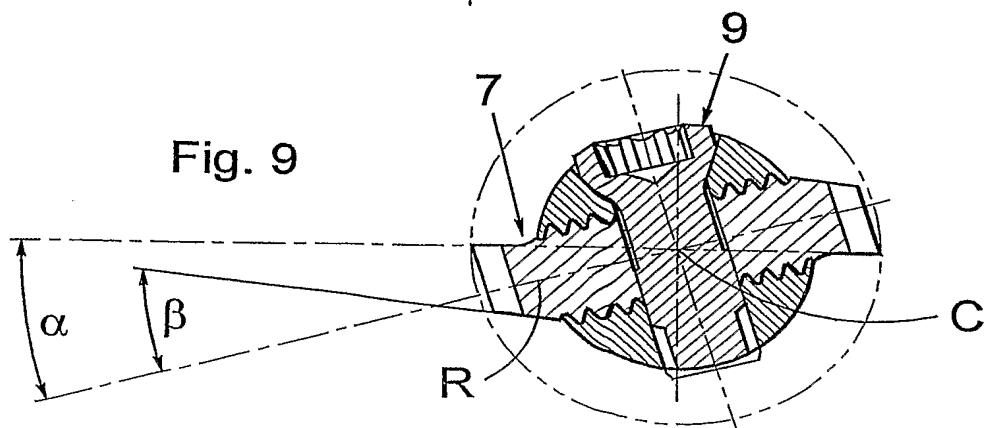
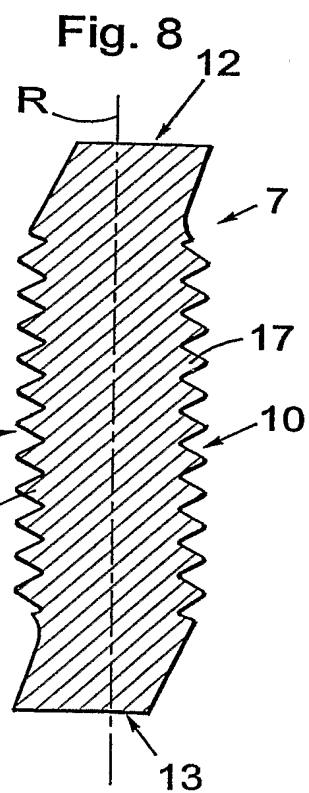
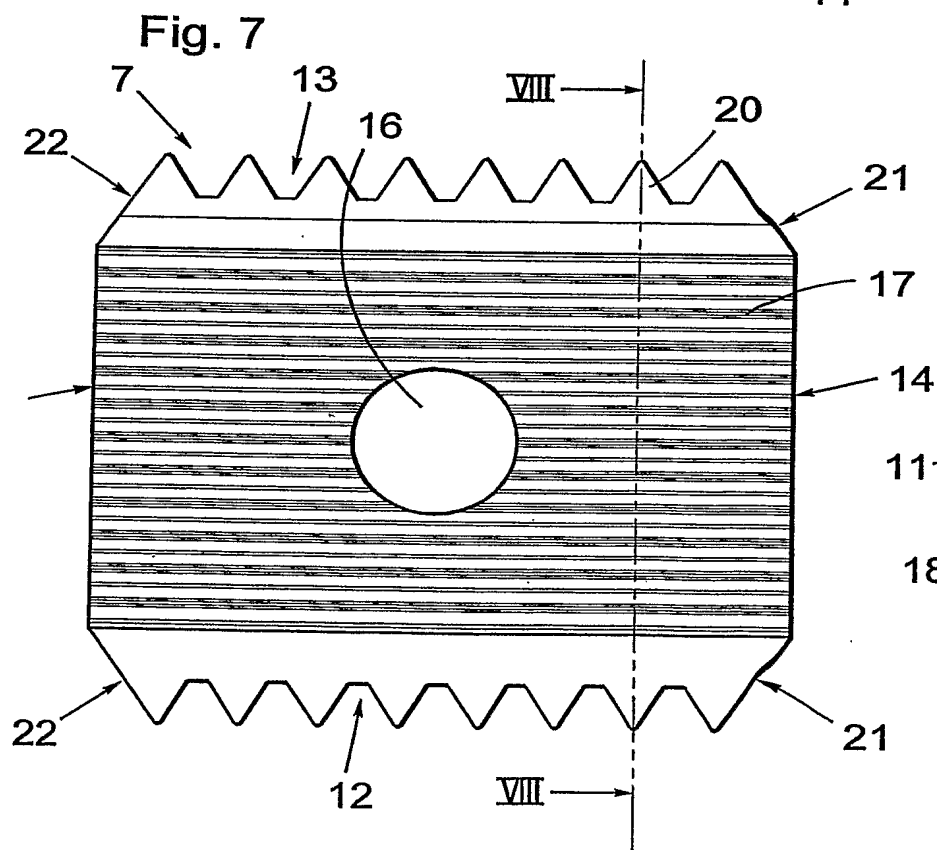
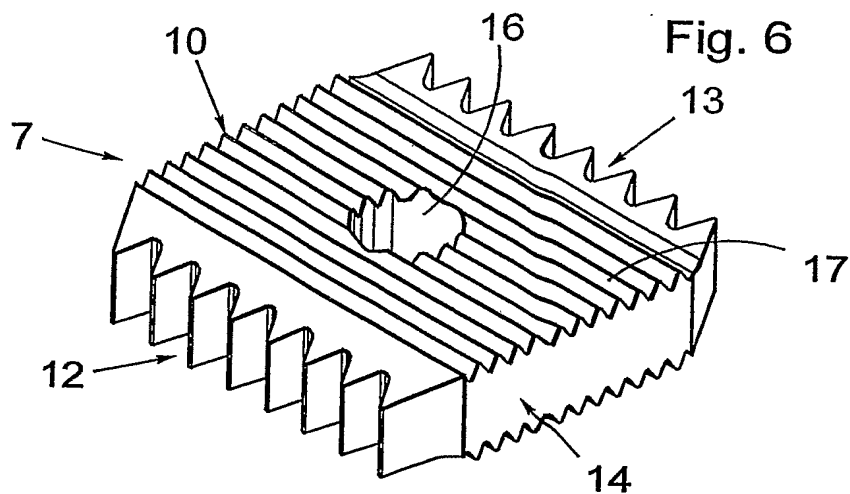


Fig. 3



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# INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 2005/000217

## A. CLASSIFICATION OF SUBJECT MATTER

IPC7: B23C 5/22

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: B23C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,A	WO 2004062839 A1 (3859700SHI MATERIALS CORPORATION), 29 July 2004 (29.07.2004), figures, abstract --	1-7
A	US 3859700 A (R.R. JILBERT), 14 January 1975 (14.01.1975), whole document --	1-7
A	DE 9211669 U1 (STELLRAM GMBH), 24 December 1992 (24.12.1992), whole document --	1-7
A	US 6102630 A (D.P. FLOLO), 15 August 2000 (15.08.2000), whole document -- -----	1-7

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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Name and mailing address of the ISA/

Swedish Patent Office

Box 5055, S-102 42 STOCKHOLM

Facsimile No. +46 8 666 02 86

Authorized officer

Fredrik Andersson / MRo

Telephone No. +46 8 782 25 00

**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

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PCT/SE 2005/000217

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